1 September 1961

Dear Ed,

Enclosed herewith is the report of our experiments with mercury vapor and SO 132 film. We believe this was a very severe test, but the observable effects were certainly small. Please do not infer that we are advocating careless handling of mercury; but if there ever should be mercury spillage it would not appear to be very serious. I hope we can discuss this at our next meeting.

Also enclosed are: (1) A New estimate of film requirements; (2) Several film inspection reports; and (3) a receipt. We will be returning the new core shortly.

Best regards

Milt

mb

cc: CFH (2)
(w/o Inspection rpts & receipt)

29 August 1961

DESCRIPTION OF TEST PROCEDURE

Samples of SO-132 film were suspended in a jar containing some mercury, as shown in the illustration (Figure 1). The jar was placed in a lightproof container. The temperature during exposure to vapor ranged from 66°F to 91°F.

When a sample was exposed to the mercury vapor for a given time, it was removed from the jar and given a sensitometric exposure. During processing it was accompanied by a sensitometrically exposed sample of the same roll of film, which was not exposed to mercury vapor. Processing was started within three minutes of sensitometric exposure, which in turn occurred within three minutes of film removal from jar or from supply roll in the case of the control. The film was processed in D-19 for 8 minutes at 68°F.

Following processing, the characteristic curve of each sample was plotted. In addition a granularity trace was made of the sensitometric strip step having a diffuse density nearest 1.0. A scanning aperture of 650μ^2 was used.

CONCLUSIONS

The characteristic curves (Figures 2, 3, and 4) show the increase in effective film sensitivity obtained by exposure to mercury vapor for 7, 24 and 96 hours. Exposure for 65 minutes showed no sensitivity change and was not plotted.

SO-132 film, processed in D-19, exhibits optimum image forming capability at about unity density. Therefore, the effective sensitivity determination is based on the exposure required to produce D=1.0. Using this criteria, Figure 5 shows the increase in effective sensitivity as a function of vapor exposure time. Four days (96 hours) of exposure to mercury vapor results

in a 1/6 f-stop increase in effective sensitivity. Increase in fog level is also plotted; fog increase is not appreciable for exposure duration of a few days.

Data from the granulatiry measurements were not reduced to numerical values due to the relatively large man/hours required; instead, the microphotometer traces are shown in Figure 6 for visual comparison. As can be noted, no apparent increase in granularity occurred for the vapor exposure periods tested.

From literature[1] on this subject, and from the results of this test, it is concluded that extremely long periods of mercury vapor exposure slightly affects the effective sensitivity of SO-132 film and has no appreciable effect on granularity while effecting a small increase in fog level.

1

A. Mees, C.E.K., The Theory of the Photographic Process, Revised Edition, Macmillan Co., 1954, pp. 120, 121.

B. Glafkides, P., Photographic Chemistry, Vol. I., Fountain Press, 1957, p. 34.

NOTE: A measurement of the vapor concentration was made with a mercury vapor detector under similar conditions but in a larger container than the jar used in this test. It indicated a concentration equal to four times the minimum toxic limit.

(ASA Standard 237.8 - 1943 Minimum toxic limit for continual breathing is 1.3 parts of mercury vapor in 100,000,000 parts of air volume, or 1 milligram of vapor in 10 cubic meters of air).

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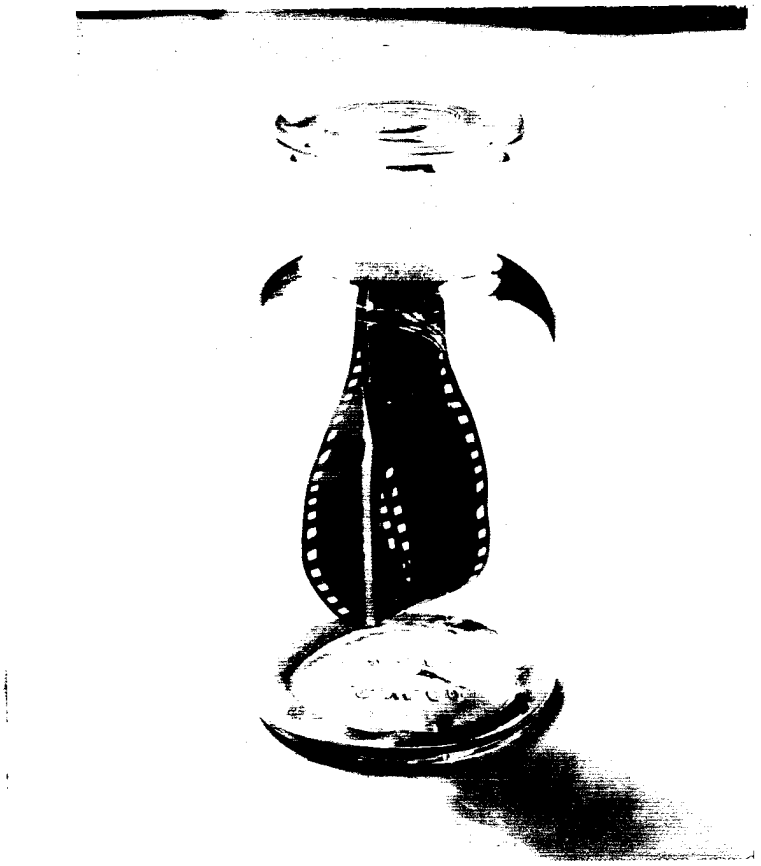

FIGURE 1.

FILM IN JAR CONTAINING MERCURY

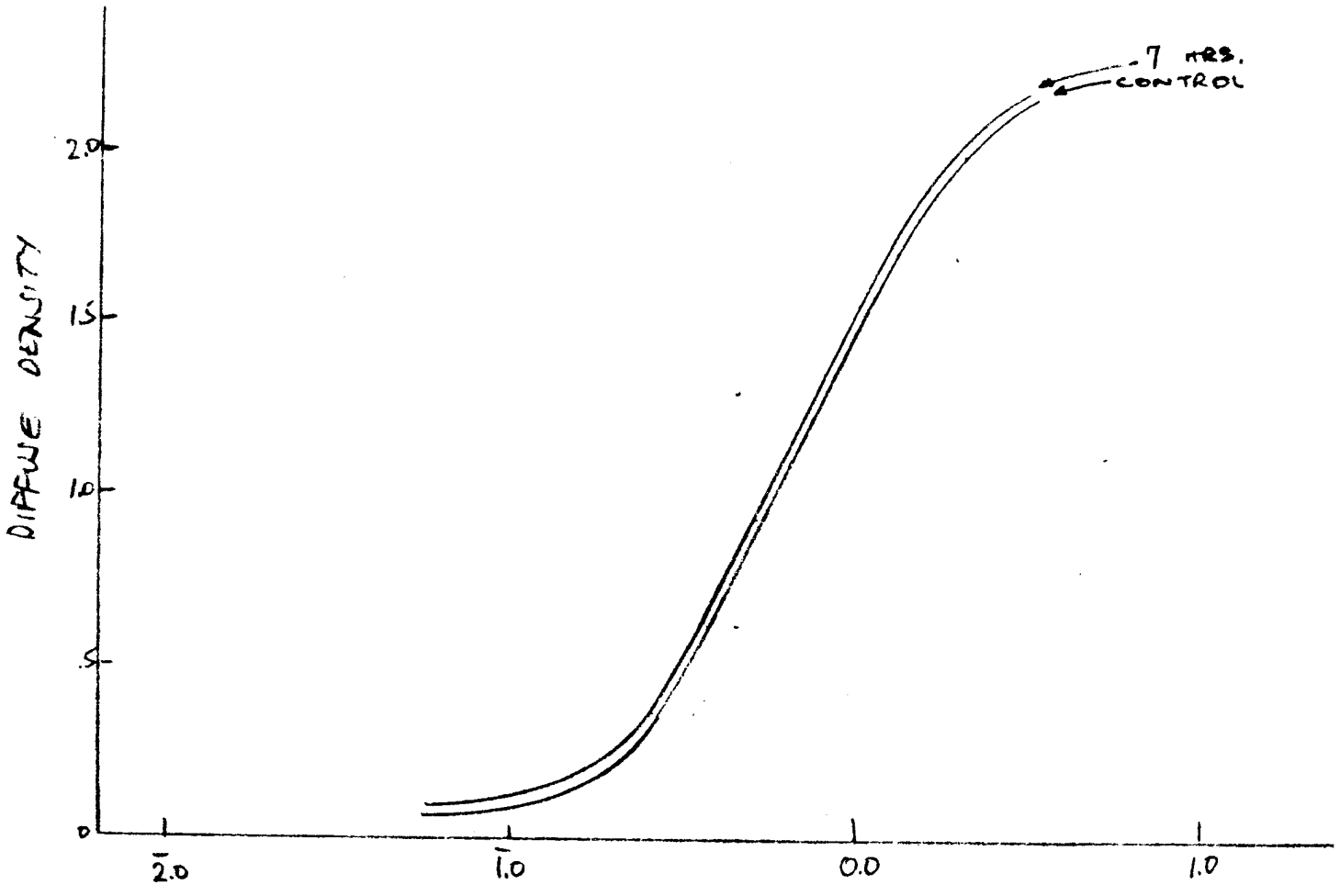

FIGURE 2.

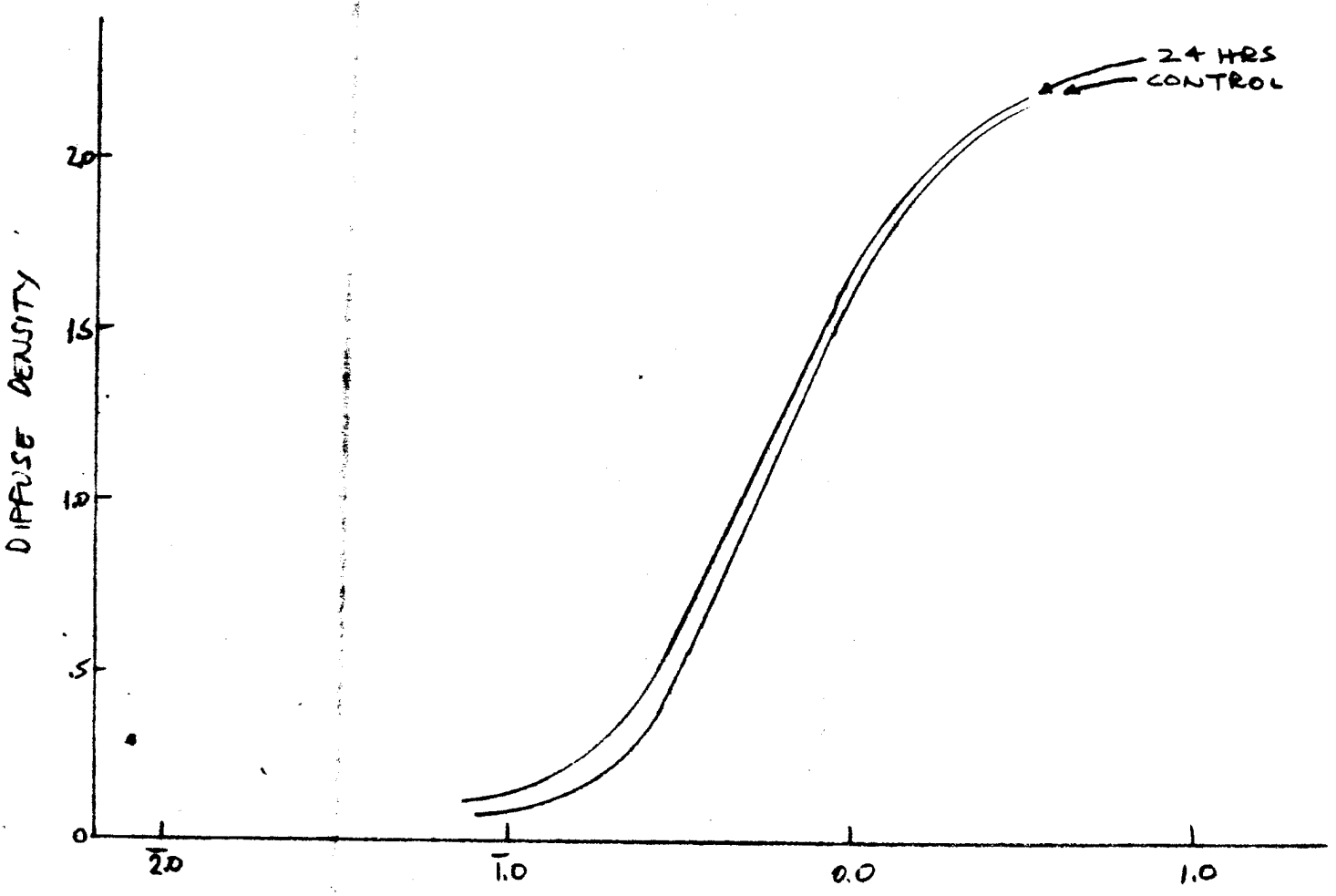

FIGURE 3

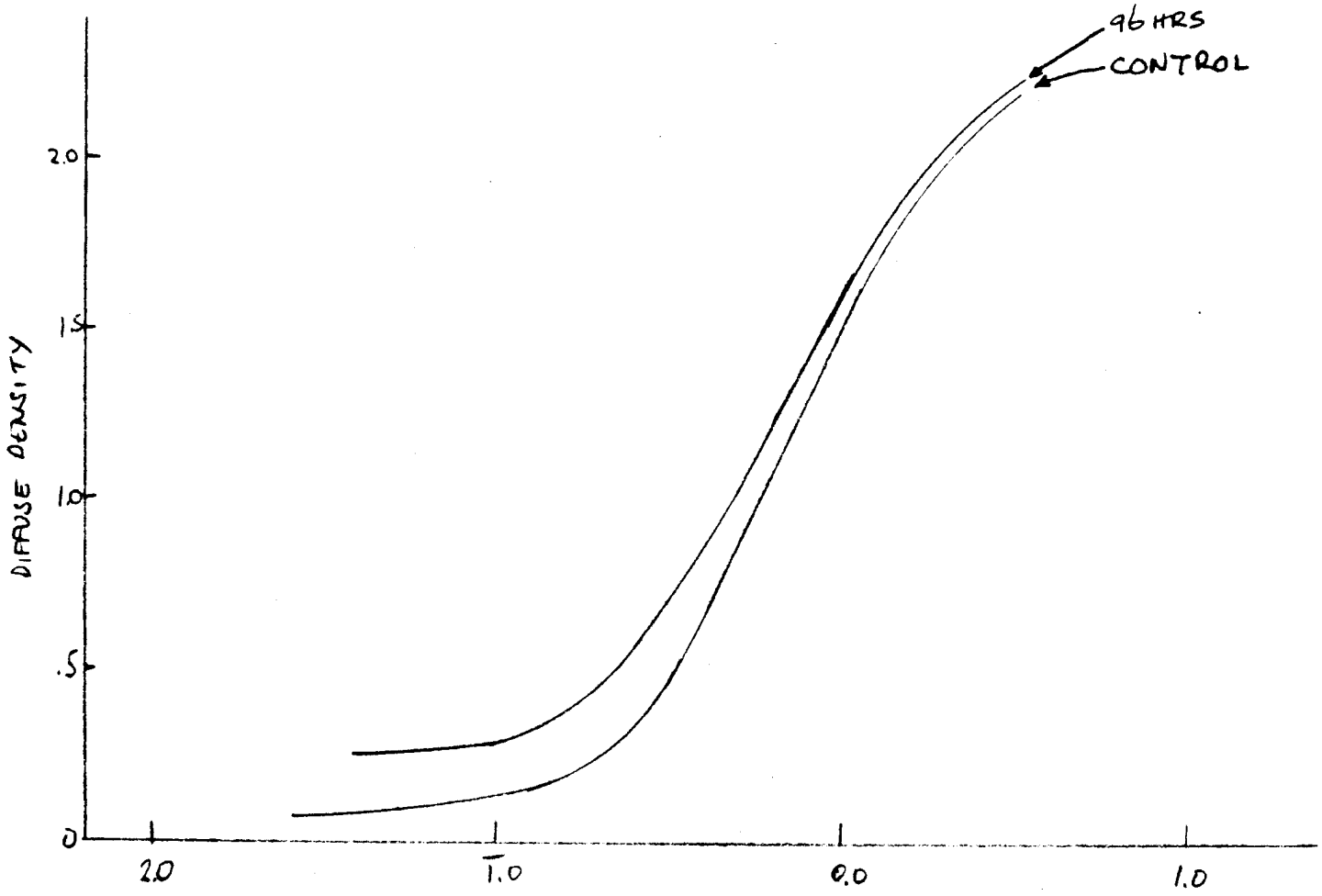

FIGURE 4.

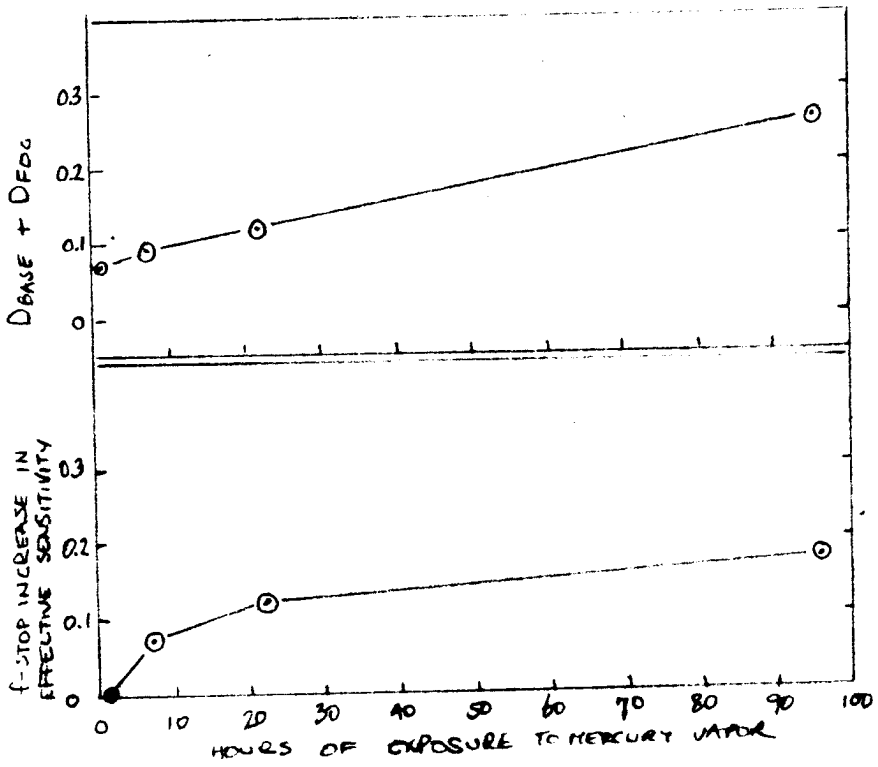

FIGURE 5

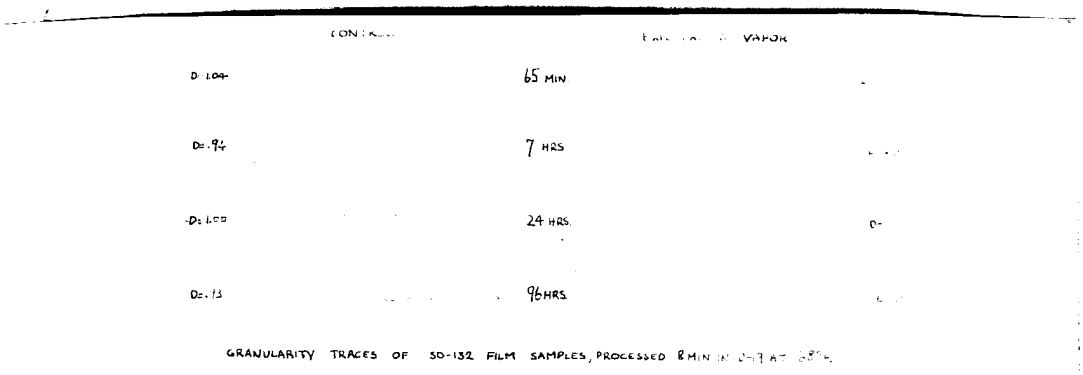

FIGURE 6

~~X~~. Granularity traces of film samples, showing transmission fluctuations (y axis) of a sample 2 mm long (x axis).